CLAIMS

1. A control system for a fuel cell assembly, comprising:

an oxygen sensor; and

a switch couplable to the fuel cell assembly and selectively actuatable to stop fuel cell operation in response to a high hydrogen condition indicated by an oxygen reading from the oxygen sensor.

2. The control system of claim 1 wherein the oxygen sensor is located proximate the fuel cell assembly and the switch is coupled to the fuel cell assembly.

3. The control system of claim 1, further comprising a hydrogen sensor, wherein the switch is also selectively actuatable to stop fuel cell operation in response to a high hydrogen condition indicated by a hydrogen reading from the hydrogen sensor.

4. The control system of claim 1, further comprising:

a hydrogen sensor; and

a temperature sensor, wherein the switch is also selectively actuatable to stop fuel cell operation in response to at least one of a high hydrogen condition indicated by a hydrogen reading from the hydrogen sensor and a high temperature condition indicated by a temperature reading from the temperature sensor.

5. The control system of claim 1, further comprising:

a hydrogen sensor; and

a temperature sensor, wherein the switch takes the form of a programmed controller that is also selectively actuatable to stop fuel cell operation in response to a hydrogen reading from the hydrogen sensor and a temperature reading from the temperature sensor, the programmed controller configured to compare the oxygen reading to a low oxygen threshold value to determine an existence of the high hydrogen condition, the hydrogen reading to a high

hydrogen threshold value to determine an existence of the high hydrogen condition, and the temperature reading to a high temperature threshold value the determine an existence of the high temperature condition.

6. The control system of claim 1 wherein the switch takes the form of a programmed controller configured to compare the oxygen reading to a low oxygen threshold value of approximately 18 percent to determine an existence of the high hydrogen oxygen condition.

7. The control system of claim 1, further comprising a hydrogen sensor, wherein the switch takes the form of a programmed controller that is also selectively actuatable to stop fuel cell operation in response to a hydrogen reading from the hydrogen sensor, the programmed controller configured to compare the oxygen reading to a low oxygen threshold value of approximately 18 percent to determine an existence of the low oxygen condition, the hydrogen reading to a high hydrogen threshold value of approximately 1 percent to determine an existence of the high hydrogen condition.

8. The control system of claim 1, further comprising:

a hydrogen sensor; and

a temperature sensor, wherein the switch takes the form of a programmed controller that is also selectively actuatable to stop fuel cell operation in response to a hydrogen reading from the hydrogen sensor and a temperature reading from the temperature sensor, the programmed controller configured to compare the oxygen reading to a low oxygen threshold value of 18 percent to determine an existence of the high hydrogen condition, the hydrogen reading to a high hydrogen threshold value to determine an existence of the high hydrogen condition, and the temperature reading to a high temperature threshold value the determine an existence of the high temperature condition.

9. The control system of claim 1 wherein the switch takes the form of a programmed controller and at least one actuator coupled to the programmed controller for control thereby.

10. A fuel cell system for use in a habitable environment, comprising:

at least one fuel cell;

an oxygen sensor;

a hydrogen sensor; and

a first switch selectively actuatable to stop fuel cell operation in response to at least one of a high hydrogen condition indicated by at least one of a hydrogen reading from the hydrogen sensor and an oxygen reading from the oxygen sensor.

11. The fuel cell system of claim 10 wherein in the first switch comprises a controller that compares the oxygen reading to a low oxygen threshold value corresponding to a first hydrogen concentration, and further comprising a second switch, comprising a second controller that compares the hydrogen reading to a high hydrogen threshold value corresponding to a second hydrogen concentration equal to or less than the first hydrogen concentration.

12. The fuel cell system of claim 10 wherein in the first switch comprises a controller that compares the oxygen reading to a low oxygen threshold value corresponding to a first hydrogen concentration and that compares the hydrogen reading to a high hydrogen threshold value corresponding to a second hydrogen concentration not greater than the first hydrogen concentration.

13. The fuel cell system of claim 10 wherein in the first switch, comprises a controller that compares the oxygen reading to a low oxygen threshold value of approximately 18 percent and compares the hydrogen reading to a high hydrogen threshold value less than 4 percent, and an actuator that terminates a flow of fuel to the fuel cell in response to a signal from the controller.

14. The fuel cell system of claim 10 wherein in the first switch, comprises a controller that compares the oxygen reading to a low oxygen threshold value of approximately 18 percent and compares the hydrogen reading to a high hydrogen threshold value of 1 percent, and an actuator that terminates a flow of fuel to the fuel cell in response to a signal from the controller.

15. The fuel cell system of claim 10 wherein in the first switch, comprises a controller that compares the oxygen reading to a low oxygen threshold value and compares the hydrogen reading to a high hydrogen threshold value, a fuel flow value, and an actuator that closes the fuel flow value in response to a signal from the controller.

16. A method of operating a fuel cell assembly, comprising:

determining a concentration of oxygen proximate the fuel cell; and

providing fuel to the fuel cell if the determined concentration of oxygen proximate the fuel cell is greater than an oxygen threshold value.

17. The method of claim 16, further comprising setting the oxygen threshold value based on an oxygen concentration value corresponding to a dangerous concentration of hydrogen.

18. The method of claim 16, further comprising setting the oxygen threshold value to approximately 18 percent.

19. The method of claim 16, further comprising:

repeatedly determining the concentration of oxygen proximate the fuel cell; and

providing fuel to the fuel cell if the determined concentration of oxygen proximate the fuel cell is not greater than the oxygen threshold value.

20. The method of claim 16, further comprising:

repeatedly determining the concentration of oxygen proximate the fuel cell;

comparing the determined concentration of oxygen proximate the fuel cell to the oxygen threshold value; and

if the determined concentration of oxygen proximate the fuel cell is not greater than the oxygen threshold value,

disconnecting an external load from the fuel cell; and

closing at least one fuel value between a fuel source and the fuel cell.

21. The method of claim 16, further comprising:

repeatedly determining the concentration of oxygen proximate the fuel cell;

comparing the determined concentration of oxygen proximate the fuel cell to the oxygen threshold value; and

if the determined concentration of oxygen proximate the fuel cell is not greater than the oxygen threshold value,

disconnecting an external load from the fuel cell;

closing at least one fuel value between a fuel source and the fuel cell;

closing at least one purge value;

disconnecting stack power;

turning off an air compressor;

turning off a cooling fan;

writing a shutdown code to a non-volatile memory, if a fault occurred; and

setting a non-restartable status in the non-volatile memory, if a non-restartable fault occurred.

22. A computer-readable media containing instructions to cause a processor to control operation of a fuel cell assembly, by:

determining a concentration of oxygen proximate the fuel cell assembly; and

providing fuel to the fuel cell if the concentration of oxygen proximate the fuel cell assembly is greater than an oxygen threshold value.

23. The computer-readable media of claim 22 containing instructions to cause a processor to control operation of the fuel cell assembly, further by setting the oxygen threshold value based on an oxygen concentration value corresponding to a dangerous concentration of hydrogen.

24. The computer-readable media of claim 22 containing instructions to cause a processor to control operation of the fuel cell assembly, further by setting the oxygen threshold value to approximately 18 percent.

25. The computer-readable media of claim 22 containing instructions to cause a processor to control operation of the fuel cell assembly, further by:

repeatedly determining the concentration of oxygen proximate the fuel cell assembly;

fuel to the fuel cell assembly if the determined concentration of oxygen proximate the fuel cell assembly is not greater than the oxygen threshold value.

26. The computer-readable media of claim 22 wherein the computer-readable media comprises a memory structure of a micro-controller.